University of Gdańsk

Subject card

Subject name and code	Discrete Mathematics, PG_00198446		
Field of study	Informatics		
Date of commencement of studies	October 2026	Academic year of realisation of subject	2026/2027
Education level	Bachelor's studies	Subject group	Obligatory subject group in the field of study
Mode of study	part-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	1	ECTS credits	7.0
Learning profile	academic	Assessment form	exam
Conducting unit			
Name and surname of lecturer (lecturers)	Subject supervisor	dr Andrzej Borzyszkowski	
	Teachers		

Lesson types

Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
Number of study hours	20.0	30.0	0.0	0.0	0.0	50

E-learning hours included: 0.0

Learning activity and number of study hours

Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
Number of study hours	50	0.0	125.0	175

Subject objectives

An introduction to the basics of discrete mathematics as required by computer science

Learning outcomes

Course outcome	Subject outcome	Method of verification
[INFOL3_W02] knows and undrstands advanced concepts of discrete mathematics, probabilistic methods and statistics	is familiar with basic algorithms in the field of arithmetic in number systems with different bases is familiar with the binary search method is familiar with the basic concepts of combinatorics and algorithms for generating combinatorial objects understands the basic concepts of number theory necessary for understanding the RSA algorithm understands the concept of recursion and is familiar with basic recursive algorithms	[SW4] test/exam - oral or written
[INFOL3_U02] is able to use his/her knowledge of higher mathematics to model and solve complex problems	can apply the algorithms they have learned to solve selected problems can perform a simple analysis of the algorithms they have learned, using recursion	[SU4] test/exam - oral or written [SU5] implementation of a problem task

Subject contents	1. Arithmetic: number systems, representation of numbers in a computer 2. Combinatorics: sequences, functions, permutations, Newton's symbol, Dirichlet's pigeonhole principle 3. Boolean functions: Boolean algebra, Boolean expressions and functions, Boolean circuits 4. Number theory: modular arithmetic, Euclid's algorithm, Fermat's theorem, RSA 5. Recursion and recursive data types: lists, stacks, queues, binary trees, Polish notation, complexity of recursive algorithms 6. Graphs: undirected, directed, representation of, depth-first and breadth-first search algorithms, shortest path search
Prerequisites and co-requisites	

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
tests	51.0%	40.0%
exam	51.0%	60.0%

Recommended reading

Basic literature	Andrzej Szepietowski, Matematyka dyskretna, Wyd. Uniwersytetu Gdańskiego 2004.
Supplementary literature	Kenneth Ross, Charles Wright, Matematyka Dyskretna, Wyd. PWN
eResources addresses	

Example issues/ example questions/ tasks being completed

- The numbers 31 and 15 are written in 8-bit two's complement (U2) notation. Perform the addition and multiplication of these numbers.
- How many three-digit numbers are there in the base-6 number system? And how many numbers have different digits?
- Draw the binary search tree resulting from inserting the words of the text one by one: "Czemu, Cieniu, odjeżdżasz, ręce złamawszy na pancerz, przy pochodniach, co skrami grają około twych kolan?" What is the height of this tree? What would it be if the words were inserted in alphabetical order? And what is the minimum height of a tree containing the above words?
- We interpret the expression * + 7 * - 6 3 5 - 2 + 4 1 as an arithmetic expression written in Polish notation. Draw a binary tree for this expression. Write the same expression in reverse Polish notation.
- There is given a graph G = (V, E), where V = {a, b, c, d, e, f, g} and E = {{a, b}, {a, c}, {a, g}, {b, c}, {b, d}, {b, e}, {b, f}, {e, f}}. Without drawing the graph, list the consecutive edges of the spanning forest generated during a depth-first search.

Work placement	Not applicable

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